AUTOMATIC HORSE POWER AND PRESSURE INDICATOR AND RECORDER.
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AUTOMATIC HORSE-POWER AND PRESSURE INDICATOR AND RECORDER.


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To all whom it may concern:

Be it known that I, EDMOND FORTIER, a citizen of the United States, residing at Kankakee, in the county of Kankakee and State of Illinois, have made certain new and useful Improvements in Automatic Horse-Power and Pressure Indicators, of which the following is a specification.

My invention is an improvement in steam-pressure and horse-power indicators for use on steam-engines, and has for an especial object to provide improvements upon the construction illustrated in my former patent, No. 623,922, dated October 8, 1901; and the invention consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation, partly in section, illustrating my invention in connection with a steam-engine having ball-governors, parts being broken away and others shown in section. Fig. 2 is a face view showing the horse-power record and the steam-pressure and horse-power indicators, together with the cylinder-stroke indicator. Fig. 3 is a detail horizontal section showing the gearing forming part of the steam-pressure and horse-power indicator. Fig. 4 is a side view of the cone-pulley which is connected with the governor, and Fig. 5 is a detail view illustrating one of the guides for the marker-bar of the horse-power recorder.

Referring now to Fig. 1, the centrifugal ball-governor A may be of any usual form and be connected with the steam-engine A in such manner as to automatically manipulate the inlet and outlet valves in the well-known manner. This governor has a rod d, which connects it with the lever d' of the cut-off valve. A cable e, of steel or other material, is connected with the governor, preferably by means of a bracket b on the rod d, and extends thence over guide-pulleys C, C', and C" to a cone-pulley i, to which the cable is made fast, so the movement of the cable as it is drawn upon by the governor A will operate to turn the pulley i in one direction, a spring-drum i' being arranged to turn the said pulley in the reverse direction, and so take up slack in the cable e. The gas-pipe y may be provided over the cable e to protect the same whenever desired. A pinion z is connected with the pulley i and is meshed with a rack H, so the said rack H will be moved longitudinally up and down as the pulley i is turned in the manner before described. The pulley i is supported in a bracket j, which is fast on the frame or casing of the indicator, and such bracket also forms a guide for the rack H in the longitudinal movements of such rack. A guide or keeper k also aids in keeping the rack H properly guided so it will operate in the desired manner. This rack H is connected with the horse-power indicator and the steam-pressure indicator in the manner presently described.

At l (see Fig. 2) I provide a scale to indicate the different points at which the steam is cut off in the cylinder. A hand or pointer m registers at one end along the scale j, is pivoted between its ends on a pin or screw n', which may be adjusted by setting it into any one of the perforations m' of the pointer m, while the other end of the pointer is connected at m" with the rack H, so the movement of the rack H will operate the pointer m and so indicate the point of cut-off in the cylinder. Near its lower end the rack H is provided with a slot p, graduated at p' at one side, as shown in Fig. 2, and the lever n is connected with the rack H by means of a screw n", operating in the slot p, so the connection n" may be adjusted up or down along the rack, as may be desired. This lever n has a short projecting arm o, which is provided with an adjustable weight o', which may be moved along the arm o and secured in any desired adjustment by a set-screw, as will be understood from Fig. 2. The lever n is provided with slots p' and p", alongside of both of which are provided scales or graduations, and bars t and q connect, respectively, with the lever n by means of screws t' and q' operating in the slots p' and p", so the connection of the bars t and q with the lever n can be adjusted as may be desired. The bar t being connected at one end with the lever n, as described, is connected at its other end with what for convenience of reference I term the "main lever" U, which puts in motion the hand of the horse-power indicator by means of the rack-segment U', as presently described. The lever U is pivoted at U and has at its free end a graduation or scale U',
and the free end of the lever t is also gradu-
ated at e, as shown in Fig. 2, and the connec-
tion between the bar t and the lever U is ef-
forced by means of a double adjustable sleeve
5 , having sleeve portions fitting both parts
t and U and screws by which it can be se-
cured to both the said parts in any desired
adjustment. The rack-segment U meshes
with a pinion U, which carries a horse-power-
10 indicating hand U, which adjusts along a
graduation U on the dial, which dial is also
provided concentrically with the graduation
U with a graduation U', along which regis-
ters the steam-pressure-indicating hand pres-
ently described.

The bar W, which I call the "marker-bar,"
as it carries a pencil or ink holder at W' at
one end, is movable longitudinally in guide-
baskets 4, which are provided with rollers 5,
upon which the bar W moves, and has a rack
6, which is meshed by the pinion U', or, if
desired, by another pinion in connection with
said pinion U', so the bar W will be moved
longitudinally as the horse-power-indicating
hand is moved by the main lever U, as before
described. This marker-bar W makes its
record upon the horse-power record, which
includes a metal plate or other suitable cir-
cular carrier X, which is toothed on its outer
edge at X and meshed by a pinion X', which
in turn is geared with a clock X and may be
supplied with cards Y, suitably inscribed,
and which may be secured by thumb-screws
or other suitable fastening, so the cards can
be changed every twelve hours, the card be-
ing arranged to be marked upon by the marker
carried by the marker-bar W, as before de-
scribed. As shown, the horse-power indica-
tor and steam-pressure indicator are support-
ed in one frame and the horse-power record
in another frame, such frames being hinged
at Z, so they can be folded together whenever
desired, the marker-bar W being moved lon-
gitudinally clear of the joint Z whenever it is
desired to fold the parts of the casing. The
steam-pressure indicator includes an expan-
sible tube a of the Bourdon type confined
within the gage-case and connecting at a'
with a pipe leading from the steam-boiler of
the engine. To the extreme end of this tube
a is connected a link a, which connects with
the bell-crank lever S, which is pivoted at S'
and has one arm provided with a toothed seg-
ment S' meshing with a pinion 3 on the shaft
55 of the steam-pressure-indicating hand U, be-
fore described. The bell-crank lever S also
has an arm S', which is connected by a dou-
ble adjustable sleeve R' with the end of the
bar q opposite that connected with the lever

m, the adjoining ends of the parts q and S'
being graduated so that the connection R' may
be accurately set in any desired position and
then secured in such position by the clamp-
ing screws, as described.

It will be noticed that I combine the steam-
pressure indicator and the horse-power indi-
cator in such manner as to secure an accu-
rate indication upon the same dial of both
and arrange the horse-power indicator to op-
erate the recording device and also connect
with the means for operating the horse-power-
indicator devices, by which to show the dif-
f erent points at which the steam is cut off in
the cylinder. Manifestly the direction of the
cable leading from the governor to the means
for operating the horse-power indicator may
be varied in many ways.

Having thus described my invention, what
I claim as new, and desire to secure by Letters
Patent, is—

1. The combination in an apparatus sub-
stantially as herein described, of the steam-
pressure-indicating hand, the horse-power-
indicating hand operating concentrically with
the pressure-gage hand, pinions in connec-
tion with said hands, a marker-bar arranged
for operation by the pinion of the horse-power-
indicating hand, guides for said marker-bar,
the main lever having a toothed segment
meshing with the pinion of the horse-power
90 indicating hand, an intermediate lever, a bar
connecting said lever with the main lever, a
rack-bar to which said intermediate lever is
connected, connections between said rack-bar
and the governor, a bell-crank lever having
95 a segment meshing with the pinion of the
pressure-gage-indicating hand, and a second
arm, a bar connecting said second arm with
the intermediate lever, and means for oper-
ating the pressure-gage indicator, substan-
tially as set forth.

2. The combination of a steam-engine gov-
ernor, a horse-power indicator, a steam-pres-
sure indicator concentric with the horse-power
indicator, connections between the governor
and the indicators whereby the governor will
operate the indicator, and a horse-power re-
corder arranged for operation by the horse-
power indicator, substantially as set forth.

3. The combination with the steam-engine
governor, and the pulley or drum and the
spring for operating the same in one direc-
tion, of a cable connection between said pul-
ley or drum and the governor, a pinion in
connection with said pulley, a rack-bar

115 meshed with said pinion and arranged for
operation thereby, a hand or pointer connect-
ed with said rack-bar and adapted to operate
in connection with a suitable scale to indicate
the point of cut-off in the cylinder, an inter-
mediate lever connected with the rack-bar
and having an arm and an adjustable weight
thereon, the power-indicator having a main
lever, the pressure-indicator having a lever,
bars connecting both said levers with the in-
termediate lever, and a power-recorder oper-
ating in connection with the power-indicator,
substantially as set forth.

4. The combination with the horse-power
indicator and the main lever for operating the
same, of the steam-engine governor, the cable
connected therewith, a pulley or drum to
which said cable is connected, means con-
necting said pulley or drum with the said
main lever, and marker devices arranged for operation by the power-indicator.

5. The combination of the power-indicator, the power-recorder, means whereby the power-indicator operates the recorder, the series of levers geared in connection with the power-indicator, the governor and intermediate devices between said governor and the series of levers, all substantially as and for the purposes set forth.

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Witnesses:

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